REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	August 1995	FINAL REPORT (07-1994 to 08-1995)

4. TITLE AND SUBTITLE

IMPROVING ACCESS TO PRIMARY CARE AT MONCRIEF ARMY COMMUNITY HOSPITAL

5. FUNDING NUMBERS

6. AUTHOR(S)

CPT JOHN M. GAAL, MEDICAL SERVICE CORPS

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

MONCRIEF ARMY COMMUNITY HOSPITAL
FORT JACKSON, SC 29207

8. PERFORMING ORGANIZATION REPORT NUMBER

16-95

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

US ARMY MEDICAL DEPARTMENT CENTER AND SCHOOL
BLDG 2841 MCCS HRA US ARMY BAYLOR PGM IN HCA
3151 SCOTT ROAD
FORT SAM HOUSTON TEXAS 78234-6135

10. SPONSORING/MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT

APPROVED FOR PUBLIC RELEASE; DISTRIBUTION IS UNLIMITED

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

Many staff members and patients at Moncrief Army Community Hospital feel there is a significant problem with patients' ability to access primary care. The purpose of this study was to improve access to primary care at Moncrief Army Community Hospital using current resources. This study consisted of a survey to determine the level of access in the primary care areas; a productivity and efficiency evaluation of the primary care areas; and an analysis of five models developed to improve access.

There were 198surveys returned (46.6% return rate). Results reflected an access problem in the Internal Medicine Clinic and the Family Practice Clinic. Use of a ratio analysis, regression analysis, and a data envelopment analysis reflected that the Troop Medical Clinic and the Access Clinic were more efficient than the other primary care areas. The Family Practice Clinic was the least efficient.

Five models were evaluated and two models were determined to be the best way to improve access to primary care within the constraints of current resources. Implementation of these two models will make better use of efficient primary care areas and improve less efficient areas, ultimately improving access to primary care for beneficiaries of Moncrief Army Community Hospital.

14. SUBJECT TERMS	15. NUMBER OF PAGES
PRIMARY CARE, ACCESS	84
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
N/A	N/A	N/A	UL

US ARMY-BAYLOR UNIVERSITY GRADUATE
PROGRAM IN HEALTH CARE ADMINISTRATION

IMPROVING ACCESS TO PRIMARY CARE AT MONCRIEF ARMY COMMUNITY HOSPITAL

SUBMITTED TO
LIEUTENANT COLONEL KEVIN WILLIAMS
IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTERS IN HEALTH CARE ADMINISTRATION

BY
CAPTAIN JOHN M. GAAL

FORT JACKSON, SOUTH CAROLINA
AUGUST 1995

ACKNOWLEDGMENTS

I want to be the first to admit that I would not have been able to endure and persevere as I have, without the support and motivation of my wife, Kim.

I would also be remiss if I did not recognize the significant impact that the teamwork and friendship of the men of the "sweat lodge" provided. It was that small motley group, always ready to throw a football or create an acronym, that turned a test of fortitude and endurance into memories of nothing but good times.

TABLE OF CONTENTS

LIST OF TABLES

Table Page

ABSTRACT

Access to primary care is an increasing concern for those affiliated with the Military Health Care System. Many staff members and patients at Moncrief Army Community Hospital feel there is a significant problem with patients' ability to access primary care. The purpose of this study was to improve access to primary care at Moncrief Army Community Hospital using current resources. This study consisted of a survey to determine the level of access in the primary care areas; a productivity and efficiency evaluation to determine which areas used its resources (providers, support personnel, and exam rooms) efficiently to produce outpatient visits; and an analysis of five models that redistribute current resources to increase capacity.

There were 198 surveys returned (46.6% return rate). Results reflected an access problem in the Internal Medicine Clinic and the Family Practice Clinic. These areas had the highest rates of beneficiaries using civilian facilities instead of the military system (15.15% and 19.19%, respectively). Use of a ratio analysis, regression analysis, and a data envelopment analysis reflected that the Troop Medical Clinic and the Access Clinic were more efficient than the other primary care areas. The Family Practice Clinic was the least efficient.

Five models were evaluated using a decision matrix. Two models were determined to be the best way to improve access to primary care within the constraints of current resources. These were: 1) expanding and augmenting the Access Clinic with assets from

other clinics, and 2) combining the Pediatric Clinic and the Family Practice Clinic to create two multidisciplinary teams of providers. Implementation of these two models will make better use of efficient primary care areas and improve less efficient areas, ultimately increasing access to primary care for beneficiaries of Moncrief Army Community Hospital.

CHAPTER 1

INTRODUCTION

The Department of Defense (DoD) operates one of the largest health care systems in the world. There are approximately 8.6 million eligible beneficiaries; 1.9 million active duty service members and 6.7 million nonactive duty beneficiaries (General Accounting Office 1994). The DoD is responsible for providing medical care to these beneficiaries. Those directly involved with the provision of this care want the beneficiaries to remain in the military health care system (MHCS). There are many reasons for retaining patients in the MHCS, these include: reducing the cost of care; maintaining control over and ensuring the quality of care beneficiaries receive; and improving patient satisfaction. Congress directed the DoD to evaluate the quality and availability of health care in the MHCS as compared to that care provided for military beneficiaries in the civilian sector. Among other things, this study, dubbed the "733 Study," supported the belief that care provided within the MHCS was more cost effective than contracting with civilian organizations to provide care for military members, retirees, and their family members (Office of the Assistant Secretary of Defense 1993). Another finding was that the Civilian Health and Medical Program of the Uniformed Services (CHAMPUS) could provide care cheaper unless DoD could better control access to its medical facilities (Gebicke 1995).

This study presumes that the cost of care in Moncrief Army Community Hospital (MACH) would be less costly than that received in the civilian sector. This point is debatable, especially when comparing individual procedures; nevertheless, it is an assumption which underlies this project. This assumption is the foundation of many of the cost saving initiatives that were conducted, and are ongoing, to improve access into the

MHCS, such as the Army's "Gateway to Care" program and the ongoing implementation of the TRICARE program. With this in mind, MACH needs to optimize access for its patients.

Conditions Which Prompted the Study

It is generally accepted that the demand for care in the MHCS, not necessarily the need for care, has exceeded the capacity of its facilities. The predictable result has been long delays for appointments and excessive waiting times for outpatient care. Many beneficiaries respond to these frustrations by turning to CHAMPUS for care; typically at a higher cost to both the government and to the patient than direct care provided by the military treatment facility (MTF). Consequently, beneficiaries frequently complain about their access to military facilities (General Accounting Office 1995).

There is a commonly held belief that there is an access problem obtaining primary care at MACH. The Customer Service Center, which tracks patient complaints, has data which shows that 8.17% of the Patient Satisfaction Surveys for fiscal year 1994 reflect patients' dissatisfaction with their ability to get an appointment within a reasonable amount of time. It is noteworthy that these surveys reflect only the opinion of patients who are physically in the facility; that is, they have successfully gained access into the system.

Conversations with many staff members reflect their perception that patients are not able to adequately or expeditiously access primary care at MACH. There needs to be a survey that is representative of all eligible beneficiaries, rather than exclusively those who are able to make use of the system. Most people, patients and staff alike, agree that there is a problem, but feel that nothing can be done to alleviate the problem due to budgetary, personnel, and space constraints.

The following are some observations which support their belief concerning the lack of access:

- The Access Clinic (a walk-in/acute care clinic) often fills its daily allocation of appointments before its scheduled closing time (1600 hours), and shifts its excess patient load to the Emergency Room (ER).
- There is a greater than four-hour wait for care of minor illnesses in the ER many evenings and weekends.
- The Family Practice Clinic (FPC), which limits its enrollment to active duty soldiers and their families, has a long waiting list of families who want to enroll.
- Patients waiting for a follow-up appointment with the Internal Medicine Clinic (IMC) often have to wait eight months (two to four months longer than the customary follow-up period).

Together, this evidence indicates an apparent problem with access to primary care at MACH.

It is difficult to determine exactly how many patients are unable to gain access into the system. Expenditure levels of CHAMPUS funds for outpatient care approximate the number of patients using other than MACH health care services. According to the Fort Jackson Directorate of Resources Management, there are approximately 80,000 CHAMPUS eligible beneficiaries in the Fort Jackson area of responsibility (Fort Jackson 1994). The CHAMPUS data shows that 6,732 patients, whose zip codes fall within the 40 mile radius MACH catchment area, received outpatient care from typical primary care categories of CHAMPUS eligible providers (see appendix 1 for list of categories and

number of patients per category). Using these selected categories was the closest, yet most conservative way, to estimate acute minor illness primary care visits. These 6,732 patients represent 48.6% of the 14,143 patients for whom claims were filed with CHAMPUS for outpatient care.

The government portion of the CHAMPUS costs associated with these 6,732 patients amounted to $787,932 for fiscal year 1994; 31.4% of the $2,510,423 paid by the government for all CHAMPUS outpatient care in the MACH catchment area. The patients (and their insurance carriers) paid a total of $1,090,677, 40% of the $2,725,679 total amount paid, to see the selected categories of civilian providers (Tri-Service CHAMPUS Statistical Database 1994). This expenditure of money represents one way to differentiate those patients who truly *need* access to care from those who only *want* access to care. That is, these patients should not be considered a "ghost population." A ghost population will access a system (i.e., use health care) because care is available, and not particularly because there is a real need for care. Patients using CHAMPUS, and thereby paying the associated deductible and co-pay, demonstrate more of a real need for care.

There are many ways to define primary care services. For the purpose of this project, primary care at MACH consists of care for acute minor illnesses currently provided in five areas: the Access Clinic; the Troop Medical Clinic (TMC); the FPC; the Pediatric Clinic, and non-urgent care provided in the ER. Primary care providers do not necessarily provide essential care to their patients, but they are the primary or first contact providers of care. Primary care providers provide comprehensive care through appropriate referrals to specialty services (Barnes and others 1995). Many patients

consider the IMC to be a primary care provider. For this study, the IMC is considered a specialty clinic, treating patients with multiple or advanced chronic diseases.

The goal of this project is to improve patient access to the most appropriate source of primary care: Family Practice, Access, Pediatric, and Troop Medical Clinics, and to reallocate resources in those clinic areas to more efficiently care for patients. Another goal is to prevent patients with minor illnesses from presenting to the ER or the IMC. This will ultimately open access for patients who currently cannot readily gain access into the system.

Constraints

The current allocation of providers and clinic resources can be found in table 1. Because of the ongoing reduction in personnel strength, and the imminent implementation of the TRICARE contract for Region 3, this project uses existing personnel and space (examination rooms) resources as bounds. It includes authorized vacancies that are budgeted for and being actively recruited. It will not take into account any unfunded projected construction.

Table 1 provides a means of comparing the resource distribution of the primary care clinics. Providers are presented as physicians (Phys), physician's assistants (PA), and nurse practitioners (NP). Support staff includes all non-providers working in the clinic. Staff/Prov and Rms/Prov are expressed as ratios of the number of support staff and the number of exam rooms, respectively, divided by the number of providers. Because the ER operates around the clock, only the numbers from a typical shift were used for comparison. ER data will reflect this conversion, to make it more comparable to a clinic, for the remainder of the study.

TABLE 1

RESOURCE ALLOCATION

	Number of Providers*						
Clinic	**Phys**	**PA**	**NP**	**Spt Staff****	**Staff/Prov**	**Exam Rms**	**Rms/Prov**
Access	1	1	-	4	2	3	1.5
FPC	3.3	2	1	13	2.06	12	1.9
Peds	3	-	1	7	1.75	8	2
TMC	1	6	2	22	2.44	20	2.2
ER***	2	-	-	5	2.5	13	6.5

* Given in FTEs.
** All non-providers in the clinic.
*** Numbers reflect a typical shift.

The MACH primary care clinics evolved without consistent centralized planning. Adequate consideration was not given to the changing primary care needs of the customers. Each clinic's location in the hospital was generally based on individual clinic needs and availability of space, independent of the others. This project will evaluate the allocation of personnel and space based on the needs of the clinics as a group, instead of individually, to develop a more coherent and efficient primary care system.

Statement of the Problem

Determine ways to improve access for patients seeking primary care at MACH within the constraints of current personnel and space resource levels.

Literature Review

The topic of improving access to primary care appears repeatedly in the literature. Typically, the issues are community wide and not facility specific. The issues related to, or constraining, access to care center around two themes: financial barriers; and non-

availability of care (providers or facilities). Either patients do not have insurance, or are otherwise unable to pay for primary care, or there are no providers or facilities located where patients can access them (Ginzberg 1991). There is a common belief that the number of patients who are unable to afford adequate access to health care is increasing (Meek 1990). These conditions generally occur in either inner city or extremely rural areas. Most of the hospitals and health systems that have attempted to improve access feel that the solution is to build clinics or satellite facilities in underserved areas (McCullough 1990). Hospitals have even promised to build clinics in impoverished areas to address the needs of the poor in exchange for approval of a certificate of need for their ultimate goal of initiating hospital renovations (Neal 1990).

In most cases, hospitalization is not dependent on the patient's ability to pay. Ironically, it is often the inability to access appropriate primary care which leads to hospitalization, which could have been avoided if timely access to primary care had been available. Timely primary care can effectively reduce morbidity and mortality. Additionally, the absence of ready access to primary care leads to inappropriate use of the ER for primary care, which is expensive because of the advanced equipment and personnel needed in the ER. Although healthy lifestyle, education, and prevention are aspects of primary care which significantly improve access through provider utilization avoidance, it takes a considerable period of time for the results of these aspects of primary care to be demonstrated; even then, the results are not easily measured. Regardless, improving appropriate access to primary care will result in more cost effective care and improved health of the population (Frelick 1992).

Patients unable to access primary care often seek care in the ER, which is not cost effective. Additionally, it is detrimental to patient satisfaction because there is typically a long wait associated with using the ER for primary care. This is partially due to the ER's more comprehensive standard of practice and partially due to the ER principal of acuity

based triage (i.e., the sicker and more seriously injured patients receive treatment before those with less acute problems). There needs to be a link between the ER and a general medical clinic or a walk-in type clinic to place the patient in the most appropriate care setting (Ginzberg 1991).

Many hospitals have established an acute minor illness clinic (AMIC) in the same location as the ER. This is done in conjunction with a centralized triage. All patients are immediately triaged and sent either to the ER for emergency care or to the AMIC for non urgent care. This has many benefits: it reduces patient waiting time; increases patient satisfaction; more efficiently uses high cost ER assets; and provides acute minor care more cost effectively (Ray 1993).

Another point to consider is how to meet the needs of children who do not have access to primary care. Typically, as with adults, these children access care through the ER. A noted difference is that they may not be able to be shunted to a hospital based AMIC. Pediatric patients treated in the ER are typically released and do not receive any follow-up care, minimizing continuity of care. It is therefore recommended that ERs develop a link with either a primary care clinic or a pediatric clinic (Bell 1991).

Meditz, Manberg, and Rosner studied the needs and desires of patients accessing an ER in a large municipal hospital in New York City which served both insured and medically indigent patients. The ER was collocated with a walk-in clinic that operated seven days per week but not twenty-four hours a day. Additionally, the hospital has a general medical clinic which provides continuity of care via regular physicians, but which operates only during normal working hours. Eighty-seven percent of those surveyed in the Meditz, Manberg, and Rosner study would have considered using the general medical clinic if it were open evenings and weekends. The study revealed that the most frequently desired nontraditional clinic times, in preferential order, were Saturday mornings and afternoons, Sunday mornings, and Monday, Wednesday, and Friday evenings.

Patients seen in the general medical clinic typically receive more comprehensive primary care than those receiving only episodic care (i.e., care received in the ER or the walk-in clinic). A clinic with expanded, and presumably more convenient, operating hours may identify and treat patients who avoid necessary care because of major conflicts or simply because of inconvenience. A clinic with expanded hours could ease the problem of access to primary care for the entire population as well as remove an unnecessary burden from the ER (Meditz, Manberg, and Rosner 1992).

Another way of evaluating and attempting to improve access is by investigating the needs of the patient population via a comprehensive community wide assessment. Some authors believe that a population often has needs that the primary care providers in that area do not provide. Murdoch and Gurr felt that a weakness of primary care services is the inability to identify all of the needs in a population. They indicated that even when barriers to access are removed or reduced, e.g., by lowering fees, the services still do not address the needs of the community as a whole (North 1991).

There are many studies concerning the use of physician extenders, PAs and NPs, as a supplement to physicians. These studies show that by augmenting physicians with physician extenders, access is greatly improved, patients are at least as satisfied, if not more so, and there is no decline in quality outcomes. Shifting a percentage of the patient workload from the physician to the extender naturally increases necessary access to the physician. This alternative requires increasing staff to provide services (North 1991).

Although Ginzberg feels that the reforms necessary to sufficiently improve access are of such a broad scale, and will need such a long period of time, that there is little chance of successful change, he still elaborates on how access related problems affect the entire medical system and should be addressed. One of the problems that results from lack of access is that many individuals enter the system only after their conditions progress to the point of becoming seriously aggravated. Upon entering the system this way, it is

probable that there will be a lack of both continuity and comprehensiveness of care. There will probably be a slippage of referrals; patients who should be evaluated by a specialist fail to be seen. Additionally, preventive services which should be provided are neglected because the institutions and personnel who would normally provide these services to the neglected population are overextended trying to cope with patients who present to the hospital with preventable emergent conditions (Ginzberg 1991).

Before reform or improvement is initiated, patient needs should be assessed. Patient surveys have long been used to assess patient satisfaction. Patient reported data can likewise measure system performance, such as access to care. Hargraves and others developed a self-administered questionnaire, containing eleven sections, that elicits information about the process of medical care. One of those processes evaluated was access to care. The Hargraves and others study response rate was 24.5%. A cover letter was mailed to the sample one week prior to the survey. The most frequent reason for the low response rate was that the subject forgot or was too busy to respond to the lengthy survey (Hargraves and others 1993).

As MACH prepares to compete with civilian health care providers for patients, the issue of patient satisfaction becomes increasingly important. More specifically, that aspect of patient satisfaction that relies on accessibility becomes especially relevant. Osterweis and Howell found that an inexpensive and useful method of assessing convenience and ease of access was a patient questionnaire. The questionnaires were mailed out, with cover letters, to random samples of patients. The mail questionnaire response rate was 50.9% (Osterweis and Howell 1979). McAlister and Davidson used a cover letter and included self-addressed, stamped envelopes and received a 74% response rate. This survey studied optometrists in federal service, a moderately motivated, homogeneous group who apparently had a desire to express their level of satisfaction (or dissatisfaction) with their working environment (McAlister and Davidson 1992).

The MHCS is similar to a capitated system in that it has a defined patient population that it has "contracted" with to provide care and a significant portion of each MTF's budget is tied to that population. The difference is that revenues in civilian capitated systems are intimately tied to the patient population, a population defined and quantified by enrollment. Military facilities do not immediately receive more capital if their population increases and MTFs do not enroll their population. If a civilian capitated system increases enrollment to the point where access suffers or may suffer, it will either purchase more providers (and facilities) with the additional capital, or reduce access and lose membership (Kongstvedt 1993). The MHCS will technically lose neither enrollment nor capital due to decreased access, so there has not been a financial incentive to improve access. That paradigm is shifting. Patient satisfaction and competition with civilian providers are becoming a significant portion of the MHCS charter. However, the constraints of being unable to increase staffing, or build facilities where the beneficiary population is the most dense, as most civilian organizations do to improve access, still exist.

Purpose

The purpose of this study was to evaluate a variety of methods to determine the optimal way to improve access to primary care for MACH beneficiaries within current resource constraints. Each primary care area has its own combination of providers, exam rooms, and support staff. A reallocation of these resources could allow more patients to access primary care.

Variables

The dependent variable in this study was the number of patients that access a primary care area, that is, the workload in patient visits. The independent variables were: providers, support staff, and exam rooms.

The operational definition of providers is physicians (DO and MD), physicians assistants (PA), and nurse practitioners (NP). Although they realistically have different and distinct scopes of practice, for this project, PAs and NPs were generalized and considered capable of treating most acute minor ailments equally.

The operational definition of support staff was registered nurses, licensed practical nurses, nurses aides, medics, secretaries, and clerks. Essentially, it included anyone permanently assigned to that clinic who was not a provider, as defined above. Temporary help, such as volunteers and Medical Hold Company soldiers were not included because of their transient nature, varying levels of skill, and sporadic schedules.

The operational definition for exam rooms was separate areas (not offices) routinely used by providers to examine and treat patients. This analysis included those areas that were not being utilized as such because of personnel shortages. Areas that were used for triage or to obtain vital signs by support staff (i.e., screening rooms) were not included in the analysis. Specialized treatment or procedure rooms were not included.

Hypothesis

Optimal integration of the variables can increase primary care accessibility for MACH patients.

Current Situation

Access Clinic

Patients utilize the Access Clinic on a walk-in and same-day appointment basis. Clinic hours are from 0730-1600, Monday through Friday. Providers see patients on a first come, first served basis. The first thirty patients receive sequential numbers when they pick up their records at the records room; the rest receive numbers as they sign in at the reception desk. Patients are given an appointment once the receptionist calls the patient's number. Appointment slots are for fifteen minutes each. Patients typically are not given follow on care, although it sometimes happens as a matter of patient convenience. Internal Medicine, Family Practice, pediatric (under 18 years of age), and active duty (through the rank of E-7) patients cannot use the Access Clinic; they are referred to the appropriate clinic. The Access Clinic will not take more patients than it can appoint in one day. Once it fills the day's appointment schedule, it refers all other patients to the ER, regardless of the patient's condition.

Emergency Room

Patients access the ER on a walk-in basis. The ER is always open. The ER staff triages patients and the most seriously ill or injured patients receive treatment before those less seriously ill or injured. During duty hours, if appointments for that day are available, eligible patients with minor illnesses are referred to the Access Clinic. The ER staff is frustrated with the relatively high number of patients with minor illnesses that present in the afternoons and evenings, once the Access Clinic is full or closed.

Pediatric Clinic

Patients must be less than eighteen years of age to receive care in the Pediatric Clinic. Patients with primary care needs receive care on both an appointed and walk-in

basis. Clinic hours are 0730-1600, Monday through Friday. Patients receive an appointment either by telephone or by direct contact with the appointment clerk. There are a limited number of appointment allocations for walk-in patients each day, although there are very few complaints registered concerning the inability to get a same day appointment with a pediatrician.

Family Practice Clinic

Patients with primary care needs receive care on both an appointed and walk-in basis. Clinic hours are 0730-1600, Monday through Friday. Patients receive an appointment either by telephone or by direct contact with the appointments clerk. Every day there is one provider who has an open schedule (i.e., the "unscheduled provider"). This provider treats up to twenty-five same day patients. Patients must be enrolled in the FPC to receive care. Only active duty soldiers and their families can enroll in the FPC.

Internal Medicine Clinic

Patients with Internal Medicine primary care needs are seen on a walk-in basis. Walk-in hours are from 0730-1230, Monday through Friday. Patients are required to receive appointments for management of their chronic problems, although the time between routine appointments is lengthy (approximately eight months). Hospital policy directs that patients being followed for a chronic condition in the IMC must also receive their primary care in the IMC. Patients are seen on a walk-in basis by a designated walk-in physician, who is frequently not the patient's regular physician. The walk-in physician sees patients on a first come, first served basis. Two providers staff the walk-in clinic on Mondays. The walk-in clinic often continues into the afternoon.

Troop Medical Clinic

Patients are seen on a walk-in basis (sick call). Clinic hours are 0730-1600, Monday through Friday, and 0730-1200, Saturdays. Only active duty soldiers are authorized care at the TMC. Soldiers in the rank of E-7 and below, if not enrolled in the FPC, must use the TMC for primary care. When feasible, the TMC provides follow on care if necessary. The TMC sees a large number of patients throughout the day. The period of greatest patient workload is typically 0900 - 1400.

CHAPTER 2

METHODS AND PROCEDURES

Access Survey

A survey was specifically designed for this study; its purpose was to evaluate access to primary care by measuring usage rates of selected primary care areas, within MACH as well as in the civilian setting. The survey was mailed to 500 randomly selected beneficiaries. Names and addresses were extracted from the DEERS beneficiary database. The DEERS file, which contained 47,407 records (names) identified as being in the MACH catchment area, was provided by the Defense Manpower Data Center.

Pilot Study

A pilot study, using a convenience sample, was conducted to evaluate two similar survey instruments. The surveys were identical, except for the question requesting a reason why the person did not use MACH; one survey was phrased in positive terms and the other was phrased in negative terms (see appendix 2 for pilot surveys). The survey was conducted at the entrance to the Fort Jackson commissary. Participation was completely voluntary. As one participant completed a survey (and returned the clipboard) the next person to enter the commissary was approached. The surveys were distributed alternatively, positive then negative. Distribution and collection of sixty surveys took approximately ninety minutes.

The descriptive statistics for the pilot survey can be found in table 2. Of the 60 surveys distributed, 54 usable surveys were collected. Almost 76% of the sample considered MACH their primary facility/hospital. The beneficiary status of the participants had the following distribution: 21.81% active duty, 14.42% active duty family member, 34.47% retiree, and 21.83% retiree family member; the remainder did not respond. Forty-eight percent of the participants were male.

TABLE 2

PILOT SURVEY

Survey Type	*n*	MACH as Primary Provider	*Beneficiary Status* AD	AD FM	Ret	Ret FM	Male	Female
Negative	29	72.4%	20.7%	10.3%	31%	24.1%	55.2%	44.8%
Positive	25	80%	23.1%	19.2%	38.5%	19.2%	40%	60%
Total	**54**	**75.92%**	**21.81%**	**14.42%**	**34.47%**	**21.83%**	**48.16%**	**51.84%**

The pilot survey indicated a need for improved access using self-reported incidents of care received outside of MACH (see table 3). The pilot survey supports the belief that patients are frequently unable to access the FPC and the IMC, with 20.37% using civilian FPC providers, and 18.52% using civilian IMC providers. There appears to be less of an access problem with the Access and Pediatric Clinics, with 3.7% using civilian AMIC clinics and 5.56% using civilian pediatricians.

Some unexpected responses to the pilot study indicated that some questions were unclear and that instructions for the participants were necessary. The high rate of verbal

questions by pilot survey participants also indicated a need for some sort of instructions to accompany the survey. Responses and overall compliance were better for the negative survey format. The final survey packet, incorporating the changes suggested by the pilot survey, can be found in appendix 3.

TABLE 3

PILOT SURVEY ACCESS RESULTS

Survey Type	Access	FPC	IMC	Pediatrics
Negative	6.9%	31.03%	27.59%	10.34%
Positive	0%	8%	8%	0%
Total	**3.7%**	**20.37%**	**18.52%**	**5.56%**

Limited resources dictated that the survey population be no larger than 500 surveys. It was determined that maximum participation, i.e., a high survey response rate, was imperative to attain some degree of statistical significance. The following measures were taken to achieve a high response rate:

- A cover letter was provided with the survey, explaining the survey's purpose, applicability to the participant, and providing the appropriate disclosure information (Leedy 1985).
- A stamped, self-addressed envelope was included to increase participant convenience and to impart a degree of investment, importance, and urgency.
- Notices of the impending survey were published in the post newspaper (see appendix 4 for submission) (Peterson 1995).

- To minimize respondent inconvenience, the survey was intentionally only one page long, with only eight questions and relatively few demographic questions (Hargraves and others 1993).
- A suspense date was clearly stipulated in the cover letter to lend a sense of urgency in responding.
- Instructions were printed on the back of the cover letter to improve compliance and data collection, and to reduce participant frustration with the survey.
- The surveys were mailed in envelopes with laser printed return addresses and professional appearing laser printed address labels. The enclosed self-addressed, stamped return envelopes had the hospital address laser printed onto the envelopes. This conveyed a degree of professionalism, and was intended to influence participants to feel a responsibility to respond.

Reliability and Validity

The survey instrument used in this project was developed solely to support and validate the assumption that there is an access problem at MACH. As such, the instrument itself has not been previously validated. The issue of validity was addressed in two ways. First, the survey is extremely straightforward, with no "hidden" or camouflaged questions. Second, the survey was distributed to six individuals to evaluate and validate. This instrument has a high degree of face validity since it measures what it appears to measure (Steiber and Krowinski 1990).

Reliability, or consistency, is difficult to control in self-administered surveys. The direct nature of the survey lends itself to consistent interpretation by the participants. The instructions that were included to further clarify participant interpretation of the questions

should also assure consistent interpretation. Additionally, the data was coded by only one person, minimizing experimenter error (Burns and Grove 1987).

Access Survey Results

Descriptive Statistics

The total population consisted of 47,407 eligible beneficiaries of the MHCS listed in the DEERS database with MACH as their principle facility, that is, they are considered in the MACH catchment area. Five hundred surveys were mailed to a randomly selected sample of this population. Seventy five surveys were returned by the Post Office because they were undeliverable; either the person was no longer at the address listed or the address did not exist. Of the 425 surveys that were delivered, 198 were returned. This is a 46.6% return rate.

Demographic data was limited to MACH as primary facility, beneficiary status, gender, and ZIP code. Seventy-two percent of the respondents considered MACH their primary facility for care. The results, shown in table GRAPH, reflect the following beneficiary status distribution: 9.09% active duty, 9.09% active duty family member, 36.87% retiree, 43.43% retiree family member, 1.01% Other, and .51% did not respond. Forty-six point two percent of the respondents were male. A substantial number of the respondents are located in three ZIP codes: 29223 (40), 29209 (30), and 29206 (20). See appendix 5 for complete distribution of ZIP codes.

The respondents generally used MACH more often than they used other providers (see table 4). The ER was the most often used primary care area (36.36%) and the Pediatric Clinic the least used (13.13%). Forty-one point nine two percent of the respondents used some other MACH service, which was usually ancillary services (e.g., laboratory, pharmacy, radiology). The beneficiaries used CHAMPUS most often in primary care to pay for Family Practice Clinic visits (11.62%). They rarely used

CHAMPUS insurance for either a visit to a Primary Care Clinic (2.02%) or for a visit to a pediatrician (4.04%). The respondents used either another insurance or paid out of pocket for Family Practice visits. They rarely used another insurance or self pay for either the ER (8.08%) or for Pediatric Clinic visits (4.04%).

TABLE 4

COMPARISON OF USE PATTERNS
(in percentages)

	ER	PCC	FPC	IMC	PED	OTH
MACH	36.36	26.26	16.16	22.73	13.13	41.92
CHAMPUS	8.08	2.02	11.62	8.08	4.04	18.18
TPI/Self Pay	8.08	4.55	19.19	15.15	4.04	22.73

When asked for the primary reason why they did not use MACH for services, the most common selection was the "other" category (31.82%). The next most frequent reason provided why MACH was not used was that the wait for an appointment was too long (23.23%). The other possible reasons were infrequently selected (see table 5).

TABLE 5

REASONS "DID NOT USE" MACH

Reason Selected	Percent Responded
Could not get timely appointment.	23.23
Do not like the provider(s).	2.53
Too far to travel.	8.08
Do not like the hospital.	1.52
Wait to see the provider too long.	2.02
Hours are not convenient.	2.02
Other reason.	31.82

Relationships Between the Variables

The relatively large number of variables (33) yielded a large number of significant relationships. Considering MACH their primary facility/hospital was significantly related to being an active duty soldier ($t(175) = 2.51, p = .013$). Considering MACH as a primary facility was significantly correlated with use of each of the primary care areas. **Not** considering MACH as the primary facility was correlated with use of primary care areas that required some sort of payment (see table 6). Not considering MACH as the primary facility was also correlated with MACH being too far to travel.

TABLE 6

MACH AS DEPENDENT VARIABLE

Variable	t Value	*p*
MACH FPC	3.294	.001
MACH ER	4.926	< .001
MACH Access Clinic	3.477	< .001
MACH IMC	3.385	< .001
MACH Pediatric Clinic	2.51	.013
CHAMPUS FPC	- 2.926	.004
CHAMPUS Pediatrics	- 3.887	< .001
TPI/Self Pay FPC	- 3.927	< .001
TPI/Self Pay IMC	- 2.618	.01
TPI/Self Pay Pediatrics	- 3.01	.003
MACH too far away	- 2.084	.039

Respondents' gender was significantly correlated with beneficiary status, that is, males were more likely to be either a retiree ($t(175) = 10.012, p < .001$) or an active duty soldier ($t(175) = 2.457, p = .015$). Female respondents were more likely to be a family member of a retiree ($t(175) = -10.611, p < .001$). There was a significant relationship between use of the primary care areas and the beneficiary status of the respondent (see table 7). The use of most of the primary care areas is positively related with family members of active duty soldiers. Within the MACH primary care areas, there is a relationship between use of the Pediatric Clinic and use of the ER ($t(175) = 4.199, p < .001$) and likewise between use of the Pediatric Clinic and use of the FPC ($t(175) = 2.418, p = .017$).

TABLE 7

MACH PRIMARY CARE AREA USAGE
AS A FUNCTION OF BENEFICIARY STATUS

Variable			
Dependent	Independent	t Value	*p*
ER	ADFM	2.348	.02
Access Clinic	ADFM	-2.232	.027
FPC	ADFM	3.620	< .001
FPC	AD	3.776	< .001
Pediatric Clinic	ADFM	5.778	< .001

The only MACH primary care area significantly related to the use of an external area was the IMC. Respondents who used the MACH IMC were also likely to have used CHAMPUS to see a civilian IMC ($t(175) = 2.669, p = .008$).

The inability to get a timely appointment was significantly related to use of CHAMPUS to go to a civilian FPC ($t(175) = 3.22, p = .002$) and to the use of other insurance (or self pay) to use a civilian ER ($t(175) = 2.125, p = .035$) or to go to a civilian FPC ($t(175) = 3.236, p = .002$). Distance, or MACH being too far to travel, was significantly related to the use of a civilian ER, using both CHAMPUS ($t(175) = 2.12, p = .012$) and other insurance (or self pay) ($t(175) = 2.279, p = .024$).

Using CHAMPUS to pay for a FPC visit was significantly related to using CHAMPUS to use a civilian ER ($t(175) = 2.541, p = .012$). Using other insurance (or self pay) for a FPC visit was significantly related to using other insurance (or self pay) to use a civilian ER ($t(175) = 5.338, p < .001$). Finally, using CHAMPUS to pay for any primary care area was significantly related to using other insurance (or self pay) for that corresponding primary care area (see table 8).

TABLE 8

CORRESPONDING PRIMARY CARE AREA PAYMENT TYPES

Payor			
TPI/Self Pay	CHAMPUS	t Value	*p*
ER	ER	8.929	< .001
PCC	PCC	2.266	.025
FPC	FPC	7.528	< .001
IMC	IMC	7.039	< .001
Pediatrics	Pediatrics	14.475	< .001

Discussion

Of the five hundred surveys mailed, seventy-five, or 15%, were returned by the post office as undeliverable. Of the surveys returned as undeliverable, forty-eight (64%) were sent to the beneficiary's unit. The DEERS database lists the unit address as the only address for active duty soldiers, although the home address is usually listed for all other beneficiaries. This address should be the most accurate since it is updated whenever a soldier inprocesses onto a new post. Because Fort Jackson is a training post, the majority of these returned surveys went to basic training units, whose soldiers turnover quickly. This turnover rate may explain the high return rate. At the 1995 OASD (HA) - U.S. Army-Baylor University Graduate Program Administrative Resident Seminar, Colonel Braendel, of the Health Budgets and Programs Office, reported that in a recent series of beneficiary surveys, which used the DEERS database for addresses, approximately fifteen percent of the samples had an incorrect address and could not be delivered. The return rate for the OASD (HA) surveys was approximately fifty five percent (Braendel 1995).

Of the 425 surveys presumed delivered, 198 were completed and returned by 23 June (one week after the suspense). This represents a 46.6% return rate. This return rate

is better than the Hargraves, et.al., survey that had a 24.5% response rate (Hargraves and others 1993); comparable to the 50.9% response rate of the Osterweis and Howell survey (Osterweis and Howell 1979) and the OASD (HA) access survey (Braendel 1995); and lower than the McAlister and Davidson survey that received a 74% response rate (McAlister and Davidson 1992).

Hargraves, et.al., felt that their minimal response rate was due to the length of the survey and that their sample population did not want to take the time to complete and return the survey. This is the primary reason the survey developed in this study was kept to one page. Osterweis and Howell felt that the cover letter was instrumental in their response rate. Likewise, the cover letter in this survey undoubtedly positively influenced the response rate. McAlister and Davidson also used a cover letter, but they were sampling a professional population (DoD and Veterans' Affairs Optometrists) who were interested in having their opinion recorded. It was believed that MACH beneficiaries also had a desire to have their needs recorded. Although they do not represent a homogeneous professional population, it is a homogeneous population in that beneficiary status is directly incumbent upon military service. The impact of this homogeneity was overestimated as reflected by the 46.2% response rate.

The 198 returned surveys reflect a statistical precision level of 98.02%, using Emory and Cooper's guide to estimating sample size. The estimated size of the population is 47,407 beneficiaries. Population dispersion was determined using the six choices for survey question number four, use of MACH primary care areas. A confidence level of 2.33 standard deviations was used to attain the 98.02% precision level. A desired interval of precision of one was used. Using this information, the Emory and Cooper methodology recommended a sample size of 194 surveys (Emory and Cooper 1991).

The usage rates of the primary care areas ranged from 13.13% - 36.36% (41.92% for "other" areas). At first glance this appears low. Although, when compared to the

usage rates of primary care areas outside of MACH, ranging from 2.02% - 19.19% (22.73% for "other" areas), there does not seem to be a dramatic need for access improvement throughout the entire system. The FPC has the highest civilian use rates, 11.62% for CHAMPUS payment and 19.19% for TPI or self pay. This is an area of concern. With a MACH usage rate of 16.16% there are more people using TPI or self pay to visit an FPC. The MACH FPC conservatively controlled enrollment when it opened. Many patients probably decided to use a civilian FPC, instead of waiting indefinitely to be accepted by the MACH FPC. Additionally, the FPC does not enroll retiree families. Regardless, this is an area where access improvement should be focused.

The IMC also had a relatively high TPI or self pay usage rate, 15.15%. Although not considered a primary care area for the purposes of this survey, it is interesting to note the usage rate of patients seeking Internal Medicine care outside of MACH. It is possible that these patients' primary care needs could be managed by the Access Clinic, with specialty consults to the IMC when indicated, if access to the Access Clinic was available. These respondents may be turning to an IMC for primary care rather than chronic care. This is a population that may truly need access into the primary care system.

The Pediatric Clinic has the lowest level of beneficiary usage, but it also has very low rates for care provided by civilian providers. This indicates that there is probably not a significant access problem for pediatric patients. Unfortunately, some of the patients going to civilian FPC providers mentioned above may be pediatric patients.

Many of the surveys specified what "other" MACH services they used. The majority of these were specialty clinics or ancillary services. The responses for these questions were similar for MACH services and civilian services. See appendixes 6 - 8 for a distribution of all "other" services used.

Similarly, when queried why they did not use MACH, almost a third of the respondents selected the "other" category. This data yielded some interesting comments

(see appendix 9). The most common answer was simply that the services were not provided at MACH.

Almost one out of four respondents (23.23%) indicated that the reason they sought care with a civilian provider was because they could not get a timely appointment at MACH. While this could be an indication of respondent bias--those individuals with an access problem are more likely than those without an access problem to respond--it could also be the source of the general feeling that there is an access problem to primary care at MACH. The question must be answered by the MHCS leadership. Is it acceptable that 75% of the population that desires care can get it in a timely manner, while 25% cannot?

It is appropriate, as well as expected, that the active duty population consider MACH their primary facility. Similarly, those individuals that have been able to use the primary care areas consider MACH their primary facility. The inverse holds true; if an individual must use a civilian provider for care, they do not consider MACH their primary facility. In addition to using civilian providers, those who did not use MACH primary care areas because it was too far away from them, felt that MACH was not their primary facility.

The use of the ER, the Access Clinic, the FPC, and the Pediatric Clinic were all significantly correlated with family members of active duty. Not only does this indicate that family members are able to access the system, but it also implies who is primarily using the primary care system.

Active duty soldiers were also significantly correlated with use of the FPC. This is probably due to the policies that exclude retirees and single soldiers from enrolling, leaving only the active duty soldiers and their family members eligible to be seen (with some exceptions). Additionally, active duty soldiers' medical problems are usually acute and not chronic, practically excluding them from the IMC. The Access Clinic is primarily for other

than active duty soldiers. These reasons affirm that the FPC is the most appropriate source of care for these individuals.

There are two sets of primary care areas that are correlated with each other. The first is use of the Pediatric Clinic and use of the ER. This may indicate that there is an access problem in the Pediatric Clinic and that patients (parents of patients) are forced to use the ER to get timely care. Considering the low number of respondents using a civilian pediatrician, a significant access problem is probably not indicated. There are more probable reasons: children tend to complain about their illnesses more frequently at night; parents are not with their children during the day because of work; and, parents are willing to wait until the next day's office hours when they are sick, but they are less likely to wait for care when it is their child who is sick.

The second correlation is between the Pediatric Clinic and the FPC. When it was initially opened, the FPC could not treat all the pediatric patients of the families that enrolled because many of the primary care managers were not yet credentialled to treat children under the age of two. This has since been rectified.

The IMC is the only MACH area that is significantly related to the use of a like civilian area. This indicates a true access concern. This means that patients that can, at some time, get into the IMC, cannot get into the clinic another time when they need care. At a minimum, this indicates inconsistent access, and potentially continuity of care issues.

Use of CHAMPUS to see civilian providers was significantly related to TPI/Self pay use of the corresponding areas. This could indicate that respondents are using both types of payments at different times during the year; however, it is more likely that there was some confusion regarding what the survey was requesting. The survey was intended to compare use of CHAMPUS as opposed to TPI/Self pay. The deductible and co-payment were not intended to be included in the self pay category. The intent was to measure the percentage of users that paid the full charge for outpatient care when they

could not receive care in the MACH primary care areas and what percentage used CHAMPUS.

CHAPTER 3

PRODUCTIVITY AND EFFICIENCY

To better assess ways to improve access in the clinics, it is necessary to determine which of the clinics is efficient, and why it is efficient. That is, what separates one clinic from another, and how can one clinic be a model of efficiency for the others. The ability to see more patients, increased workload, is a function of productivity. Therefore, the efficient use of resources to produce an optimal number of visits is the goal. Crude productivity (i.e., total number of visits) is easily measured, but is not an appropriate measure of productivity, since the areas have dramatically different levels of providers, exam rooms, and support personnel.

Ratio Analysis

Traditionally, productivity analysis has relied on some type of ratio analysis. The ratio analysis calculates and attempts to assist in the understanding of the relationship between the two variables used. For this study, there are three input variables: number of providers, number of support staff, and number of exam rooms. There is one output variable: the number of clinic (outpatient) visits in FY 94. The workload data was retrieved from the Medical Expense Performance Reporting System (MEPRS). Table 9 shows the values for these variables for the primary care areas studied.

TABLE 9

INPUT AND OUTPUT VARIABLES

Clinic	Providers	Support Staff	Exam Rooms	FY 94 Visits
Access	2	4	3	13588
FPC	6.3	13	12	17659
Peds	4	7	8	19992
TMC	9	22	20	84608
ER*	2	5	13	10281

* ER data adjusted to more closely reflect a clinic.

Productivity ratio analysis has been defined in a number of different ways. The traditional simple mathematical formula is productivity equals input divided by output (Mayberry 1991). Table 10 shows this method of analysis for the clinics, and corresponding ranking, for each ratio.

TABLE 10

RATIO ANALYSIS

Clinics	Prov/Visits	Rank	Spt Staff/Visits	Rank	Exam Rms/Visits	Rank
Access	0.1472	2	0.2944	2	0.2208	1
FPC	0.3568	5	0.7362	5	0.6795	4
Peds	0.2001	4	0.3501	3	0.4002	3
TMC	0.1064	1	0.2600	1	0.2364	2
ER	0.1945	3	0.4863	4	1.2645	5

Note: Ratios were multiplied by 1000 to facilitate comparison.

The productivity ratio can also be reversed and used for health care applications (e.g., bed days per nursing hour or patients seen per physician) (Silkman 1986). The primary care areas can be analyzed using a series of the inverted productivity ratios. These ratios, reflecting outputs divided by inputs, and the corresponding ranking are shown in table 11. Inverting the ratio will not affect the ranking, but it does provide numbers that are easier to comprehend. These numbers can be considered number of outputs per input (e.g., number of visits per provider). A shortcoming of ratio analysis is that one service unit (i.e., clinic) may have an exemplary ratio with one input, yet an abysmal ratio with another input and a different service unit may have the inverse productivity ratios. While this extreme did not occur with the primary care clinics, there are some clinics that do not perform at an equitable level across all three ratios.

TABLE 11

INVERSE RATIO ANALYSIS

Clinics	Visits/ Providers	Rank	Visits/Spt Staff	Rank	Visits/Exam Rooms	Rank
Access	6794.00	2	3397.00	2	4529.33	1
FPC	2803.02	5	1358.38	5	1471.58	4
Peds	4998.00	4	2856.00	3	2499.00	3
TMC	9400.89	1	3845.82	1	4230.40	2
ER*	5140.50	3	2056.20	4	790.85	5

* ER data adjusted to more closely reflect a clinic.

It is possible to aggregate the rankings and derive a final ranking. This would be valuable if each of the ratios could be definitively weighted to reflect its relative importance. Unless an empirical or objective methodology is used to assign the relative weights, a potential for bias is introduced. Silkman felt that this bias is amplified in health

care because of the many different opinions on appropriate allocation techniques and the lack of consensus on relative value of the variables. This applies to the primary care areas since it is not clear which variable(s) are more "valuable" with respect to increased workload. Additionally, each ratio is limited to one input and one output and a ratio analysis is not easily configured to accommodate situations where there are multiple inputs interacting to produce multiple outputs (Silkman 1986). As the number of inputs and outputs increase, and as the number of service units increases, this method of analysis becomes quite cumbersome and the results become vague (Sherman 1984).

Productivity assessment is further exasperated when the inputs are measured in different terms (i.e., the inputs are not interchangeable). For example, one provider is not equivalent to one exam room--for productivity assessment they cannot be directly substituted. The inputs cannot simply be combined and divided by the outputs to produce an accurate ratio (Sherman 1984).

As expected, the TMC is usually the most productive, regardless of the productivity ratio measure used. The Pediatric Clinic sees the next highest number of patients, yet its visit per provider ratio is the second lowest. On the other hand, the Access Clinic sees the second lowest number of patients, but because it has such a low number of providers and total resources, it is ranked very highly in all the ratio measures. This gives the initial impression that the Access Clinic providers are more productive than the Pediatric Clinic providers.

Regression Analysis

Another method of productivity analysis is a regression analysis. Regression analysis is considered more comprehensive than ratio analysis because it can accommodate multiple outputs and inputs. The inputs and outputs simply become variables in a statistical regression analysis. Regression analysis also stipulates whether the relationship

is statistically significant, and therefore meaningful. Finally, regression analysis, through the regression equation, provides a manager with the ability to predict output.

A regression analysis was done with number of visits as a dependent variable and each of the input variables, individually, as the independent variable. The only input variable that was significantly related to number of visits was support staff ($t(3) = 3.776$, $p = .03254$). A relationship exists that indicates that the number of visits increases as the number of support staff increases. It is surprising that the number of providers is not more significantly correlated with the number of visits.

Although there is no significant correlation, the magnitude of the correlation coefficient can be used to prioritize the resources that have an effect on the number of visits. Using this rationale, visits are influenced by, in priority order: number of support staff, number of providers, and then the number of exam rooms (see table 12).

TABLE 12

CORRELATES
(Dependent Variable = Visits)

Variables	t Value	*p*	*r*
Providers	2.532	.08527	.8524
Support Staff	3.776	.03254	.9089
Exam Rooms	2.961	.05949	.7657
DF = 3			

Using the regression equation, output, the dependent variable, can be estimated for any combination of inputs. Table 13 uses the regression equation containing the only independent variable, support personnel, that is significantly correlated with the dependent variable, visits, in order to predict workload. Using this method of productivity analysis,

the Access Clinic is highly productive, and the Pediatric Clinic and the TMC are moderately productive. Table 14 depicts the values derived using all the variables to ascertain the regression equation, rather than limiting the analysis to only the significant variable. This is done to illustrate that these variables not only influence the dependent variable, but they also interact with each other to influence the dependent variable through interaction with each other. When comparing the data in table 13 to the data in table 14 it is evident that using all the variables gives dramatically different estimates of workload. The goal is to achieve prediction accuracy, not to decide which inputs belong and which do not (Silkman 1986). The Pediatric Clinic now appears to be the most productive.

Unfortunately, regression analysis uses the least-squares technique which results in estimates of average [central tendency] relationships. Therefore, each service unit is evaluated against the average, rather than a benchmark, or the most efficient service unit (Silkman 1986).

TABLE 13

REGRESSION ANALYSIS
(using only statistically significant independent variable)

	Visits			
Clinics	**Actual**	**Calculated**	**Difference**	**% Dif**
Access	13588	5679.56	7908.44	139.24%
FPC	17659	39859.30	-22200.30	-55.70%
Peds	19992	17072.80	2919.20	17.10%
TMC	84608	74039.04	10568.96	14.27%
ER*	10281	9477.31	803.69	8.48%

* ER data adjusted to more closely reflect a clinic.

TABLE 14

REGRESSION ANALYSIS
(using all variables)

	Visits			
Clinics	**Actual**	**Calculated**	**Difference**	**% Dif**
Access	13588	14879.95	-1291.95	-8.68%
FPC	17659	31898.71	-14239.71	-44.64%
Peds	19992	7364.87	12627.13	171.45%
TMC	84608	79468.50	5139.50	6.47%
ER*	10281	12515.97	-2234.97	-17.86%

* ER data adjusted to more closely reflect a clinic.

Data Envelopment Analysis

An alternative method of evaluating productivity in service units, such as clinics, that have multiple inputs and outputs, is Data Envelopment Analysis (DEA). DEA is a linear programming technique originally developed by Charnes, Cooper, and Rhodes to evaluate nonprofit and public sector organizations (Charnes, Cooper, and Rhodes 1978). It evaluates the efficiency of each service unit in relation to all the other service units in the organization. It has since been determined to be a valuable tool for a variety of service organizations (Sherman 1984). Appendix 10 contains the DEA reformulations used to apply the DEA formulas to a standard linear programming software package.

The DEA technique effectively neutralizes the difficulty with unbiased weighting encountered by ratio analysis for service units that have multiple inputs and outputs. Therein lies the strength of DEA; its ability to simultaneously evaluate multiple outputs and inputs while providing quantifiable guidance for managers to make improvements. The linear programming technique mathematically attempts to determine a set of coefficients that give the highest possible efficiency ratio of outputs to inputs. This technique compares the inputs and outputs of each service unit and selects the most

efficient service units relative to the other units in the reference set (Young 1992). In this case, the reference set is the group of primary care areas at MACH.

DEA identifies which service units are inefficient, and the magnitude of the inefficiency. Any service unit with an efficiency rating below 1.0 (or 100% efficient), as compared to its reference set, is operating less efficiently. Standard linear programming software also provides a reference service unit that is more efficient than the service unit being evaluated. See table 15 for an illustration of efficiency ratings using the primary care areas in MACH. As the table reflects, the Access Clinic and the TMC are efficient with respect to the other areas and the TMC is the area of reference for the inefficient areas.

TABLE 15

DATA ENVELOPMENT ANALYSIS OF CLINICS

Service Unit (Clinic)	Efficiency Rating	Efficiency Reference
Access	100%	N/A
FPC	35.67%	TMC
Pediatrics	75.01%	TMC
TMC	100%	N/A
ER*	54.68%	TMC

* Uses ER converted to clinic figures.

The linear programming solution provides a factor which is used to determine the appropriate level of each input to use, to reach the existing level of output, if the service unit is to be managed as efficiently as the reference service unit (Young 1992). The following series of tables (16A-D) illustrates how the reference service unit and

adjustment factor change based on the reference set. The first table is the full set of all areas. The succeeding tables show the changes that occur when a reference area is removed and the analysis is run again.

TABLE 16A

DEA ANALYSIS
(Full Reference Set)

Clinic	Efficiency Rating	Reference Clinic	Adjustment Factor
Access	100%	N/A	-
FPC	35.32%	TMC	0.2087
Peds	74.26%	TMC	0.2363
TMC	100%	N/A	-
ER	54.68%	TMC	0.1215

TABLE 16B

DEA ANALYSIS
(less TMC)

Clinic	Efficiency Rating	Reference Clinic	Adjustment Factor
Access	100%	N/A	-
FPC	41.26%	Access	1.2996
Peds	84.07%	Access	1.4713
ER	75.66%	Access	0.7566

TABLE 16C

DEA ANALYSIS
(less Access Clinic)

Clinic	Efficiency Rating	Reference Clinic	Adjustment Factor
FPC	58.89%	Peds	0.8833
Peds	100%	N/A	-
ER	100%	N/A	-

TABLE 16D

DEA ANALYSIS
(less ER)

Clinic	Efficiency Rating	Reference Clinic	Adjustment Factor
FPC	58.89%	Peds	0.8833
Peds	100%	N/A	-

To illustrate how the DEA reference unit and corresponding adjustment factor can be used as a tool for managers to alter resource distribution, table 17 uses a DEA analysis of four of the primary care areas. The TMC was excluded because it is so much more efficient than the other areas it skewed the data; it was so dramatically more efficient than the other areas that it would have provided a poor illustration. The table has the three inefficient areas, as compared to the Access Clinic, and their optimal resource distribution.

The adjustment factor is provided through the linear program used to run the DEA. The reference service unit happens to be the Access Clinic for all the areas, in this case, although each area could have a different reference service unit. The actual value of

the reference unit output and inputs in multiplied by the adjustment factor to derive a composite, or recommended level of inputs and outputs. To show what impact the redistribution of assets may have, the actual assets are shown as well as the excess levels of the resources. The final column is what the DEA analysis recommends each area should operate with, to operate as efficiently as the reference unit and still maintain the current level of output.

One of the underlying requirements for a DEA analysis is that the service units are equal in size and function. There are many examples of using DEA to compare similar but not identical service units, such as banks (Sherman 1984), nursing homes (Silkman 1986), and hospitals (Young 1992) (Hao and Pegels 1994). In this analysis, the areas are equated at the level of care--primary care. It is understood that these areas do not perform exactly the same functions on the same patients, but they can be evaluated in comparison with each other.

Additionally, as with all objective efficiency analysis techniques, DEA results must be tempered according to organizational and specific service unit goals and missions as well as with managerial judgment. Managers must make decisions based upon their intimate knowledge of their service units peculiarities (e.g., personnel, equipment, physical layout, etc.) and also apply their experience and expertise (Young 1992).

In this study, the DEA analysis is useful to prioritize which clinics most efficiently use resources and inversely, which do not need the resources they have. The efficiency priority order of the primary care areas is: TMC, Access Clinic, Pediatric Clinic, ER, and

the FPC. This determination is necessary as a justification for any redistribution of resources.

TABLE 17

MANAGEMENT APPLICATION OF DEA RESULTS

Family Practice Clinic

Efficiency Rating = 41.26%

		Access Clinic				**DEA**
Variable	**Adj. Factor**	**Reference**	**Composite**	**FPC Actual**	**Excess**	**Optimal**
Visits	1.2996	13588	17659	17659	0.04	17659
Prov	1.2996	2	2.60	6.3	3.70	2.60
Spt Staff	1.2996	4	5.20	13	7.80	5.20
Exam Rms	1.2996	3	3.90	12	8.10	3.90

Pediatric Clinic

Efficiency Rating = 84.07%

		Access Clinic				**DEA**
Variable	**Adj. Factor**	**Reference**	**Composite**	**Peds Actual**	**Excess**	**Optimal**
Visits	1.4713	13588	19992	19992	-0.02	19992
Prov	1.4713	2	2.94	4	1.06	2.94
Spt Staff	1.4713	4	5.89	7	1.11	5.89
Exam Rms	1.4713	3	4.41	8	3.59	4.41

Emergency Room

Efficiency Rating = 75.66%

		Access Clinic				**DEA**
Variable	**Adj. Factor**	**Reference**	**Composite**	**ER* Actual**	**Excess**	**Optimal**
Visits	0.7566	13588	10281	10281	0.32	10281
Prov	0.7566	2	1.51	2	0.49	1.51
Spt Staff	0.7566	4	3.03	5	1.97	3.03
Exam Rms	0.7566	3	2.27	13	10.73	2.27

CHAPTER 4

MODELS

After reviewing the results of the access survey, the productivity analysis, and the floor plans, it is surprising how well the primary care areas are actually organized and managed. To review the earlier findings, the access survey reflects that there does not appear to be an access problem for active duty soldiers, indicating that the TMC does not need to be improved dramatically. The Pediatric Clinic, Access Clinic, and the ER do have some need for improvement but they do not appear to need dramatic improvement. The primary areas of concern regarding access into the MACH system are the FPC and the IMC. Improving the capacity of, and therefore the access into, the Access Clinic should ultimately improve access into the IMC because IMC access is limited by patients requiring primary care, not chronic care.

The productivity and efficiency analysis confirmed that the TMC used its resources more efficiently to "produce" more workload (i.e., see more patients) than the other primary care areas. The Access Clinic was also very efficient although, because of its small size, not exceedingly productive in terms of gross numbers. It should be a target for expansion and augmentation. The Pediatric Clinic and the ER were not as efficient, and are targets for some improvement. The FPC was the least efficient and therefore the area that needs the most improvement.

Surprisingly, most of the areas are using the available exam space in the clinic areas. There is little extra room for additional staff members in any of the areas. The number of administrative personnel is kept to a minimum; the majority of the support personnel are care givers.

With these findings in mind, improvement will most likely come from work sharing, shifting the patient population to another type of provider, modifying management philosophy or practice patterns, and/or completely moving clinics. The following models take these guidelines into consideration, but also adhere to the primary constraint of this study--that no modification will use increased resources (in the aggregate).

Model 1

The Access Clinic is designed to have four exam rooms, two physician's offices, two triage/vital signs rooms, and one larger room that could be a combination physician's office and exam room. Within the current space constraints, there is no convenient room for any additional support personnel.

The FPC is using all its exam rooms. There is no room for additional providers. It currently has a ratio of two exam rooms to one provider. While there is no definitive required ratio, the two to one ratio is generally considered the minimum, yet adequate ratio for efficient patient flow (Rostenberg 1986).

The Pediatric Clinic is designed to have ten exam rooms, two screening rooms, and eight office areas. Two of the exam rooms are currently used as administrative offices. It has the lowest support staff to provider ratio (1.75) than any of the primary

care areas. Pediatrics clinics typically have a higher exam room to provider ratio than medicine or general practice clinics (Rostenberg 1986).

In this model, the Access Clinic will increase its current number of active exam rooms to four. This will improve the provider to exam room ratio, from 1.5 to 2.0. This increased ratio should increase patient throughput and slightly increase the number of patients seen per day. Additionally, the TMC will provide one PA to assist with the initial influx of patients early in the morning, from 0730 - 0830. One PA working the first hour of each day would increase the workload by approximately twenty patients per week.

Similarly, a PA from the TMC should assist the FPC from 1630 - 1800. This PA would not report to the TMC until 0900. This would allow the FPC to increase its productivity by approximately twenty-five visits per week.

Finally, the providers and staff of the FPC will participate in creating some sort of incentive program to increase efficiency. Using the regression analysis as a guide, they should be able to see a minimum of 14,000 more patients a year, if operating at the "normal" rate of the primary care areas.

As an alternative to placing a PA in the FPC, which would force the FPC to offset some support personnel and at least one physician to supervise the PA, a PA could staff the Access Clinic from 1630 - 1900. This PA would report to the TMC at 1000 on those days. One of the two ER physicians would also be assigned to the Access Clinic from 1630 - 1900 to see patients and supervise the PA. The physician would, in effect, be on call to assist the other ER physician. The ER staff would triage patients as they arrive at the ER and direct patients with acute minor illnesses to the Access Clinic. Additionally,

this clinic could see FPC patients who were unable to get a necessary same day appointment. Patients would have their vital signs and history taken as part of the triage process; therefore, the ER would only need to provide one support person to the Access Clinic during this time.

Having this evening clinic should relieve the burden on the ER to provide an inappropriate, higher standard of care than necessary to patients with non-urgent care needs. This should reduce the wait time and backlog in the ER. The extended hours should also increase patients' ability to access the Access Clinic. One significant drawback to this alternative is that the Access Clinic is on the floor above the ER and not convenient for the physician to cover both areas. The lack of physical closeness between to two areas may confuse and frustrate patients.

Model 2

The Access Clinic will exchange locations with the Gynecology (Gyn) Clinic. The Gynecology Clinic has eight exam rooms, four physicians' offices, two screening rooms, and two treatment/special procedure rooms. This relocation would greatly enhance the opportunities to increase the productivity and scope of the Access Clinic. To increase the scope of practice, and because the new location for the Gyn Clinic is smaller than its original location, a Gynecology Nurse Practitioner would remain in the clinic to see Access Clinic patients with gynecological problems as well as the usual Gyn Nurse Practitioner patients. There would also be room for an internist to see IMC walk-in patients in the new Access Clinic location. This improvement in scope would provide the

Access Clinic providers convenient on site internal medicine consultation, reducing the number of referrals to the IMC, and the internist would dramatically reduce the burden of walk-in patients in the IMC.

This physical relocation would improve patient throughput in the Access Clinic due to the higher exam room to provider ratio. It would reduce the number of referrals to the Gyn Clinic and the IMC by shifting care to the lowest, earliest level of primary care. The reduced number of patients with minor illnesses would allow the internists to focus on patients with multiple and/or complicated chronic diseases, and dramatically improve access into the IMC for chronically ill patients. Additionally, this would place the Access Clinic in a better location to implement an after hours clinic that uses the ER to triage patients, since it is just down the hall from the ER. This would reduce patient confusion and allow the physician to better support the ER when necessary.

Model 3

In this model, a pediatrician will be designated to see a number of FPC pediatric patients. This will reduce some of the patient load in the FPC. A pediatrician will be able to treat these patients more efficiently than an FPC provider. The first two exam rooms in the Pediatric Clinic, directly across the hall and the closest exam rooms to the FPC, will be dedicated to FPC patients. Patients would still make appointments through the FPC, be screened in the FPC, and remain FPC enrolled patients. The close affiliation between the two clinics would facilitate any cross consultation necessary to maintain continuity of care for the entire family.

In effect, this would increase the number of providers seeing patients in [for] the FPC by one provider. It would reduce the number of providers in the Pediatric Clinic, yet, the increase in access to the FPC and the increased efficiency of the pediatricians should more than offset this reduction in access into the Pediatric Clinic. Moving a medic from the TMC to the Pediatric Clinic, increasing the pediatrics support staff by one, because of the significant relationship between support staff and workload, would also help alleviate the burden of losing a provider. Because there appears to be a substantial access problem in the FPC and a minimal problem in the Pediatric Clinic, this trade off should be acceptable in the aggregate.

Model 4

A similar concept, yet a further departure from the current process, is to combine the Pediatric Clinic and the FPC. There could be tremendous economy of scale and economy of scope savings in this arrangement. There would only need to be one reception area (FPC because it is larger) and one appointments area (the current Pediatrics reception desk). This would allow one administrative area and two screening rooms to be converted back to exam rooms. Since it has the larger waiting room, the FPC would screen all patients in its two screening areas. Once screened, patients would wait in whichever area their primary care "team" worked.

There would be two primary care teams, each consisting of two pediatricians and three FPC practitioners. Having this team assigned as the primary care manager will allow for efficient coverage during provider absences. Because of the overlap in scope of

practice, the providers would maintain the collegial support necessary for provider satisfaction. The team would increase the number of physicians able to provide oversight for the FPC physician extenders. The teams would be better able to absorb walk-in patients than individual providers.

The support staff would be shared by the entire clinic. This would also provide an economy of scale savings, especially when there are support staff absences. The support staff would be rotated on both "sides" of the clinic, improving their ability to support the providers and improving job satisfaction. Job satisfaction would be improved by their increased scope of care and by changing the monotony of working in the identical location every day. The significant positive relationship between support staff and workload indicates that an improvement in the productivity and motivation of the support staff should increase workload.

Additionally, having two similar teams would allow the clinic to remain open during the lunch period and allow the hours to be extended, if deemed necessary; two concepts that would improve efficiency and patient satisfaction.

There are two significant drawbacks to this model. The first is the natural tendency to resist change. Each of the clinic's staff will initially feel very uncomfortable working in a new environment, with a new philosophy of care. The second drawback is that these two clinics are part of two separate departments. Neither department will be willing to be absorbed by, or lose a clinic to, the other.

Model 5

Another possibility is to redirect patients away from the inefficient FPC and toward more efficient areas. All pediatric patients up to a cutoff age (set according to FPC pediatric population) will be seen only in the Pediatric Clinic. All active duty soldiers will be seen in the TMC. All walk-in and same day patients will be seen in the Access Clinic. The FPC would become, for all intents and purposes, an appointment only clinic, with a defined population of family members--spouse and adolescent children only.

Because it is extremely efficient, the TMC could probably absorb the increased workload without reducing its access to care for its current population. The Pediatric Clinic, while more efficient than the FPC, would be more likely to be adversely impacted by the shift in source of care. The Access Clinic would also be significantly impacted. It would be impacted to such a degree that model two, or something similar, would have to be implemented to enable the Access Clinic to absorb the increased workload. Overall, this is a more efficient method of treating patients, so productivity would probably increase.

This model would probably be perceived by the staff of the TMC, the Pediatric Clinic, and the Access Clinic as a form of patient dumping. There would be considerable staff discord and a morale induced decline in productivity would result. The improved access into the FPC may allow the acceptance of retirees and retiree family members into the FPC. This would ultimately improve access into MACH primary care and increase patient satisfaction with MACH.

Evaluation

The models have been compared using four criteria:

1) The potential to increase the number of patients able to access care at MACH.
2) The degree of patient satisfaction gained (or lost) due to the changes dictated by the model.
3) The degree of staff satisfaction gained (or lost) due to the implementation of the model.
4) The relative difficulty of implementing the model.

Each of the models has its merits and each has its drawbacks. Each model's strengths and weaknesses will be discussed in this section. The recommended alternative will be based on a decision matrix using the above criteria. The first two criteria, relating directly to patients, will be weighted heavier than the last two criteria.

Strengths and Weaknesses

Model 1, augment the Access Clinic and extend hours in either the FPC or the Access Clinic, is relatively easy to implement. It requires the displacement of only a few TMC PAs each day, and only for a few hours. It would require the conversion of an administrative room into an exam room and possibly storing some supplies in an administrative office (break room or NCOIC's office). This model's weakness is that the pace of the clinic, already fast and in a small area, will increase. This will accentuate patients' perceptions that they are being "herded" through the clinic. Staff satisfaction will decline due to the increased pace.

Model 2, the relocation of the Access Clinic and the Gyn Clinic, has its strength in the potential for increased workload. Augmenting and expanding the Access Clinic is clearly warranted due to its ability to efficiently use its resources to see an optimal level of patients. Increasing the area, the waiting area and the number of exam rooms will also dramatically improve the level of patient satisfaction. Unfortunately, a complete and comprehensive move of two clinics, on separate floors, is a work and time intensive operation requiring much coordination. The majority of the furniture and equipment from each clinic will need to be moved. Each of the clinic's phone lines will need to be redirected. An intensive patient awareness campaign will need to be initiated to minimize patient confusion and to maximize patient acceptance.

Model 3, using a pediatrician to see FPC pediatric patients, has its strength, like Model 1, in its ease of implementation. Very few individuals will be involved or inconvenienced. Although there may be a moderate increase in adult access to the FPC, the FPC providers would not prefer to have a portion of their patients seen by a provider in a different clinic. This dissatisfaction by the staff is its weakness. The pediatricians will feel they are doing another clinic's work; a completely founded perception.

Model 4, creation of a new clinic using pediatrician/family practice providers, has its strength in the ultimate satisfaction level of both the patients and the staff. A team approach will ultimately increase access to care and provide a greater degree of continuity of care for the patients. Initially, the providers may feel disoriented and resistant, but eventually, the providers should find this team concept rewarding. This model's weakness lies in its difficulty to implement. This combination of two different clinics, across clearly

delineated departmental lines, is rare and very difficult to obtain consensus by all parties involved. Staff resistance with this type of a clinic will be very strong and aggressive, especially during the planning and initial implementation stages.

Model 5, redirecting FPC active duty soldiers and pediatric patients to the TMC and the Pediatric Clinic, respectively, has its strength in its relative ease of implementation. Although probably an unpopular scenario, it would not require much work besides some basic patient education to implement. The improvement to access may be minimal, albeit appreciated by those who would be provided entrance into the MACH system. This model's greatest weakness lies in the high degree of staff dissatisfaction. The FPC providers will perceive this change as a loss of confidence in their ability to see their share of the patient workload, as well as a departure from the broad scope of medicine they expected to practice--family medicine. The TMC and the Pediatric Clinic, although able to absorb the increased patient workload, will resent performing another clinic's workload because that clinic is less efficient.

Decision Matrix

A traditional decision matrix was used to determine which model to recommend. Each model was ranked 1 - 5 along each of the four criteria; 1 reflects the lowest score--little or negative impact, 5 reflects the highest score--large or positive impact. The matrix is additive, the highest combined score for a model is considered the best alternative. The first two criteria, potential to increase access into the system and degree of patient

satisfaction, were given a weight of two because they are considered more important criteria of success than the other two criteria. Table 18 shows the decision matrix.

TABLE 18

DECISION MATRIX
(ranked scores in columns)

	Increase Patients	Patient Satisfaction	Staff Satisfaction	Degree of Difficulty	**Total**
Weight	*2*	*2*	*1*	*1*	
Model 1	3	1	2.5	4.5	**15**
Model 2	5	4	5	2	**25**
Model 3	2	3	2.5	4.5	**17**
Model 4	4	5	4	1	**23**
Model 5	1	2	1	3	**10**

Outcome

Model 2, the geographic exchange of the Access Clinic and the Gyn Clinic, has the highest score, twenty-five; it is the best choice. Model 4, the creation of pediatrician/family practice provider teams, also has a high score, twenty-three; it is the next best selection. Clearly these two models are better than the other three, when evaluated using this methodology and these criteria. Although the intent of this analysis is to determine the one best model to implement, the two superior models are not mutually exclusive. That is, each could be implemented separately or they could be implemented in conjunction with each other. Implementing both of these models would offer the hospital

an increased benefit over implementation of only one model, concerning the improvement of access to primary care at MACH.

CHAPTER 5

CONCLUSION

Recommendation

Two models, Model 2, the relocation of the Access and the Gyn Clinics, and Model 4, the creation of a new combination Pediatric/Family Practice Clinic, are recommended for implementation to best improve access for patients seeking primary care at MACH, operating within the constraints of current personnel and space resource levels. These two models were clearly better than the other models proposed in this study.

This study first determined the degree of access, or lack of access, in the primary care areas at MACH using a beneficiary survey. The results of the survey indicated that the two greatest areas in need of access improvement were the FPC and the IMC. Model 2, by expanding the capability and capacity of the Access Clinic, and by augmenting it with an internist, addresses the problem of access into the IMC. Model 4, by expanding and augmenting the FPC with the Pediatric Clinic, directly addresses the problem of access into the FPC.

The second part of this study was concerned with determining which of the primary care areas should be targeted for change. This analysis consisted of a productivity analysis, using ratio and regression analysis, and an efficiency analysis, using the DEA technique. Ultimately, the clinics were prioritized based on their productivity and efficiency. The TMC and the Access Clinic were rated best, and the FPC was the worst.

These findings indicated that the TMC and the Access Clinic should be expanded or used to support the other areas. Model 2, by expanding the Access Clinic and positioning for an extended hours clinic staffed by TMC providers, is based on this determination. The findings also indicated that the FPC should be targeted for change. Model 4, by augmenting the FPC with the Pediatric Clinic, is in concert with this determination.

Discussion

In lieu of actual clinic or personnel changes, there are other means, not explored in this study, aimed specifically at productivity and patient satisfaction, that would result in improvements to access to care. A concerted emphasis, with complete staff acceptance and compliance, on productivity improvement would open the clinics to additional patients. Undoubtedly, patient frustration and staff dissatisfaction combine to decrease productivity. Focused improvement on customer service and customer relations, not merely complaint management, but rather, providing the expected service in a courteous and efficient manner, would indirectly improve productivity and eventually, access to care (Lee, Clarke, and Glassford 1993).

The scope of this study, working within the current resource constraints of a system that is over burdened, served to over simplify a very complex problem. The changes in the health care environment, especially the paradigm shift from inpatient to outpatient care, coupled with the reality of decreasing resources, creates a paradox that does not lend itself to simple or comprehensive solutions. While the models recommended are logically sound, a more realistic approach to improving access to MACH would have

to be broad in scope and multifaceted and would necessitate the expenditure of resources in the short term to achieve long term improvements.

Internal improvements that require additional resources include increased, upgraded, and improved telephone access and equipment. Any time physicians and support staff have to wait to use a telephone, or are forced to physically leave a clinic to retrieve information that could be obtained telephonically, efficiency and productivity suffer. Likewise, each time a patient unsuccessfully attempts to reach a clinic by telephone, because of an inadequate telephone system, the likelihood that the patient will seek care outside of the hospital increases.

Similarly, the addition of a telephone triage system, easily accessed by patients, would create tremendous improvement to the access into the primary care system. A telephone triage system would probably significantly reduce the number of visits, on average, for each beneficiary, in a primary care clinic. If the number of actual visits is decreased by half, then the clinic could double the size of the more appropriate population it serves. Telephone triage would undoubtedly have a positive impact on patient satisfaction as well as attitudes concerning the hospital. A telephone triage system could dramatically reduce the number of non-urgent patients in the ER, in turn reducing the average wait in the ER (Derlet and others 1995).

Expending additional resources to further the ability of preventive medicine to have an impact on the health of the population would also result in long term benefits for the primary care system. With the goal of keeping beneficiaries healthy and out of the clinics, an aggressive marketing and education program aimed at patient health self-

responsibility and the benefits of preventive medicine would ultimately result in decreased outpatient visits. Decreased discretionary outpatient visits provide significant improvements in the number of patients able to access the primary care system (Fries and others 1993).

A departure from the traditional military model of outpatient care may be warranted. Traditionally, the bulk of military outpatient care is delivered within the bounds of a facility designed for inpatient care and support, and modified for outpatient care. The relocation of outpatient care out of the military care facility into an appropriate number of ambulatory care centers, located in areas of greatest beneficiary population density, are warranted (Barnes and others 1995). Unfortunately, this radical departure from military medicine would require a new vision and tremendous expenditures of funds.

These scenarios are not out of line with the trend in military health care. Instead of using only military owned and operated networks, Congress has decided to use civilian contractors also. Congress decided to implement a regionalized managed care program in an attempt to reform the entire MHCS. This program is called TRICARE, and is designed to improve the quality, cost, and accessibility of services for MHCS beneficiaries. TRICARE uses regional, fixed price, at risk contracts to support the MTFs in a region. TRICARE offers three options, an HMO option, a PPO option, and the standard CHAMPUS indemnity-like plan. The MTF is the center of each network and has the right of first refusal for specialty clinics and inpatient care.

TRICARE offers a uniform benefit which is intended to dramatically improve access to primary care for all beneficiaries. TRICARE, like any managed care system, also

utilizes many utilization management techniques to ensure that only the appropriate care, at the most efficient location, is provided.

TRICARE will provide access and control where it has been traditionally absent from military facilities. Existing efficiencies within the MHCS will continue unabated, inefficient areas will either conform or be eliminated. The assumption that additional resources would not be forthcoming in the MHCS are confirmed by the implementation of TRICARE. Rather than increase the capability of the MHCS to improve access, Congress opted to augment a diminishing MHCS with a system that should ultimately improve access to health care for all MHCS beneficiaries.

APPENDIX 1

CHAMPUS FY 94 Outpatient Primary Care Expenditures

Specialty Code*	Number of Patients	Number of Visits	Paid by Patient**	Paid by Government
Physician's Assistant	4	4	$30.00	$103.44
General Practice	399	650	$17,782.58	$14,913.46
Family Practice	402	653	$17,006.54	$13,533.50
Internal Medicine	898	2,775	$61,012.26	$86,618.00
Pediatrics	147	302	$5,859.68	$7,872.86
Nursing	10	89	$1,983.11	$3,323.08
Miscellaneous	96	374	$13,906.22	$13,150.70
Group Practice	4,767	16,473	$972,914.60	$648,023.67
Nurse Practitioner	9	19	$182.5	$393.47
Totals	**6,732**	**21,339**	**$1,090,677.49**	**$787,932.18**

* Assigned to the claim by CHAMPUS fiscal intermediary.
** Includes payments made by patients' insurance.

APPENDIX 2

"Positive" Pilot Survey

PRIMARY CARE ACCESS SURVEY

1. Do you consider Moncrief your primary facility/hospital? (please circle): Yes No

2. What is your beneficiary status? (circle one): a. Active Duty Family Member b. Retiree

c. Active Duty d. Retiree Family Member e. Other _____ (Specify)

3. Gender (please circle): Male Female

4. Circle each of the Moncrief services that you currently use, or have used within the last year, for medical care:

a. Emergency Room b. Access Clinic c. Family Practice Clinic

d. Internal Medicine Clinic e. Pediatric Clinic (for eligible children) f. Other _____ (Specify)

5. Circle any of the services that you currently use, or have used within the last year, for medical care, from a civilian provider or facility (using CHAMPUS):

a. Emergency Room b. Acute Minor Illness Clinic c. Family Practice

d. Internal Medicine Clinic e. Pediatric Clinic (for eligible children) f. Other: _____ (Specify)

6. Circle any of the services that you currently use, or have used within the last year, for medical care, from a civilian provider or facility (paying yourself or using insurance other than CHAMPUS for payment):

a. Emergency Room b. Acute Minor Illness Clinic c. Family Practice

d. Internal Medicine Clinic e. Pediatric Clinic (for eligible children) f. Other: _____ (Specify)

7. Circle the primary reason why you use the health care provider that you currently use (circle one and explain):

a. Getting an appointment is easiest (clinic? _____)

b. Prefer the provider(s) (why? _____)

c. Is closest (distance to travel? _____)

d. Prefer the facility (why? _____)

e. Fewest days to wait for an appointment (clinic? _____)

f. Hours are most convenient (I prefer: _____)

g. Other reason: _____

8. Home ZIP Code: _____

APPENDIX 2
"Negative" Pilot Survey
PRIMARY CARE ACCESS SURVEY

1. Do you consider Moncrief your primary facility/hospital? (please circle): Yes No

2. What is your beneficiary status? (circle one): a. Active Duty Family Member b. Retiree

c. Active Duty d. Retiree Family Member e. Other _____ (Specify)

3. Gender (please circle): Male Female

4. Circle each of the Moncrief services that you currently use, or have used within the last year, for medical care:

a. Emergency Room b. Access Clinic c. Family Practice Clinic

d. Internal Medicine Clinic e. Pediatric Clinic (for eligible children) f. Other _____ (Specify)

5. Circle any of the services that you currently use, or have used within the last year, for medical care, from a civilian provider or facility (using CHAMPUS):

a. Emergency Room b. Acute Minor Illness Clinic c. Family Practice

d. Internal Medicine Clinic e. Pediatric Clinic (for eligible children) f. Other: _____ (Specify)

6. Circle any of the services that you currently use, or have used within the last year, for medical care, from a civilian provider or facility (paying yourself or using insurance other than CHAMPUS for payment):

a. Emergency Room b. Acute Minor Illness Clinic c. Family Practice

d. Internal Medicine Clinic e. Pediatric Clinic (for eligible children) f. Other: _____ (Specify)

7. If you did not use Moncrief for the above services, circle the primary reason (circle one and explain):

a. Could not get a timely appointment (clinic name? _____)

b. Do not like the provider(s) (why not? _____)

c. Too far to travel (distance to hospital? _____)

d. Do not like the hospital (why not? _____)

e. Wait at hospital for appointment too long (clinic name? _____)

f. Hours are not convenient (I would prefer: _____)

g. Other reason: _____

8. Home ZIP Code: _____

APPENDIX 3
Cover Letter

DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES ARMY MEDICAL DEPARTMENT ACTIVITY
FORT JACKSON, SOUTH CAROLINA 29207-5720

REPLY TO ATTENTION OF:

May 30, 1995

Administrative Resident

Hello,

There is an increased interest in determining to what degree patients use Moncrief Army Community Hospital. I am a resident in Health Care Administration at Moncrief and am conducting a survey to determine the level of access to primary care.

The information gained from this survey will greatly help me assess the current level of access to care. Maximum participation is essential to ensure that the results are complete and representative. Please take a few minutes to complete the attached survey and mail it back to me by **June 16, 1995**. The knowledge gained from this study will help improve access to care at Moncrief.

Your participation is completely voluntary. You are assured of complete anonymity because no names will be recorded on the surveys. No attempt will be made to identify anyone who completes a survey. Your opinion counts, and will be important to the decisions made to further improve our services.

To help you complete the survey, there are instructions printed on the back of this page. If you have any questions about the survey please feel free to call me at 751-2648.

Thank you for your assistance.

Sincerely,

John M. Gaal
Captain, U.S. Army
Administrative Resident

APPENDIX 3

MONCRIEF ARMY COMMUNITY HOSPITAL
PRIMARY CARE ACCESS SURVEY

1. Do you consider Moncrief your primary facility/hospital? (please circle): Yes No

2. What is your beneficiary status? (circle one): a. Active Duty Family Member b. Retiree

c. Active Duty d. Retiree Family Member e. Other _____ (Specify)

3. Gender (please circle): Male Female

4. Circle each of the services that you currently use at Moncrief, or have used within the last year, for medical care:

a. Emergency Room b. Access/Primary Care Clinic c. Family Practice Clinic

d. Internal Medicine Clinic e. Pediatric Clinic (for eligible children) f. Other _____ (Specify)

5. Circle any of the services that you currently use, or have used within the last year, for medical care, from a civilian provider or facility (other than Moncrief), using CHAMPUS for payment:

a. Emergency Room b. Acute Minor Illness Clinic c. Family Practice

d. Internal Medicine Clinic e. Pediatric Clinic (for eligible children) f. Other: _____ (Specify)

6. Circle any of the services that you currently use, or have used within the last year, for medical care, from a civilian provider or facility (other than Moncrief), paying yourself or using private insurance other than CHAMPUS for payment:

a. Emergency Room b. Acute Minor Illness Clinic c. Family Practice

d. Internal Medicine Clinic e. Pediatric Clinic (for eligible children) f. Other: _____ (Specify)

7. If you answered question 5 or 6, circle the ONE primary reason why you did not use Moncrief (circle one and explain):

a. Could not get a timely appointment (clinic name? _____)

b. Do not like the provider(s) (why not? _____)

c. Too far to travel (distance to hospital? _____)

d. Do not like the hospital (why not? _____)

e. Wait to see the provider too long (clinic name? _____)

f. Hours are not convenient (I would prefer: _____)

g. Other reason: _____

8. Home ZIP Code: _____

APPENDIX 3

SURVEY INSTRUCTIONS

Question

1. Answer **yes** if you routinely seek care, or intend to seek care, at Moncrief.

2. Circle the beneficiary status of the person to whom the survey was addressed (e.g., if parents are completing for their children).

3. Self explanatory.

4. Circle each of the services you received from Moncrief within the past year.

5. Circle each of the services you received from providers, outside of Moncrief, who were paid, partially or in full, by CHAMPUS.

6. Circle each of the services you received from providers, outside of Moncrief, who were paid by you or by your private insurance.

7. If you did not answer question 5 or 6, skip this question. If you answered question 5 or 6, choose the **one primary reason** why you did not use Moncrief for these services.

8. Put the five digit ZIP code where you live.

APPENDIX 4

NEWS RELEASE

During the month of June, Moncrief Army Community Hospital will conduct a survey to determine beneficiaries' level of access to primary care. A representative sample of beneficiaries was randomly selected to receive a survey form. Anyone receiving a survey is asked to complete it accurately and to quickly return it in the enclosed stamped, self-addressed envelope. Survey results will be utilized to further enhance access and services.

APPENDIX 5

DISTRIBUTION BY ZIP CODE
(38 separate ZIP codes - 194 responses)

ZIP Code	Number	Percentage	ZIP Code	Number	Percentage
29223	40	20.62%	29137	2	1.03%
29209	30	15.46%	29036	2	1.03%
29206	20	10.31%	29072	2	1.03%
29210	11	5.67%	29053	2	1.03%
29203	8	4.12%	29006	1	0.52%
29212	8	4.12%	29171	1	0.52%
29170	7	3.61%	29180	1	0.52%
29061	6	3.09%	29164	1	0.52%
29070	6	3.09%	39006	1	0.52%
29204	5	2.58%	23504	1	0.52%
29205	5	2.58%	29135	1	0.52%
29033	5	2.58%	74701	1	0.52%
29045	4	2.06%	29112	1	0.52%
29073	4	2.06%	29172	1	0.52%
29054	3	1.55%	29130	1	0.52%
29169	3	1.55%	29044	1	0.52%
29207	2	1.03%	29078	1	0.52%
29201	2	1.03%	29063	1	0.52%
29115	2	1.03%	29071	1	0.52%

APPENDIX 6

"OTHER" RESPONSES FOR QUESTION 4
(Services used at MACH)

	Number of Responses	Percentage of Respondents	Percentage of Surveys Returned
Specialty Clinic*	36	38.30%	18.18%
Pharmacy	23	24.47%	11.62%
Gynecology	15	15.96%	7.58%
Radiology	10	10.64%	5.05%
Laboratory	6	6.38%	3.03%
TMC	2	2.13%	1.01%
Social Work Service	1	1.06%	0.51%
Use VA	1	1.06%	0.51%
Totals	94		198

* All responses that referred to a specialty clinic are included.

APPENDIX 7

"OTHER" RESPONSES FOR QUESTION 5
(Civilian services using CHAMPUS to pay)

	Number of Responses	Percentage of Respondents	Percentage of Surveys Returned
Specialty Clinic*	21	45.65%	10.61%
Pharmacy	5	10.87%	2.53%
Gynecology	5	10.87%	2.53%
Obstetrics	5	10.87%	2.53%
Use VA	4	8.70%	2.02%
Laboratory	3	6.52%	1.52%
Radiology	2	4.35%	1.01%
MRI	1	2.17%	0.51%
Totals	46		198

* All responses that referred to a specialty clinic are included.

APPENDIX 8

"OTHER" RESPONSES FOR QUESTION 6
(Civilian services using Third Party Insurance or self-pay)

	Number of Responses	Percentage of Respondents	Percentage of Surveys Returned
Specialty Clinics*	26	53.06%	13.13%
Pharmacy	6	12.24%	3.03%
Gynecology	6	12.24%	3.03%
Radiology	3	6.12%	1.52%
Obstetrics	3	6.12%	1.52%
Mammography	2	4.08%	1.01%
Use VA	2	4.08%	1.01%
Laboratory	1	2.04%	0.51%
Totals	49		198

* All responses that referred to a specialty clinic are included.

APPENDIX 9

"OTHER" RESPONSES FOR QUESTION 7
(Reasons why patients did not use MACH)

	Number of Responses	Percentage of Respondents	Percentage of Surveys Returned
Service needed not available at MACH	19	29.69%	9.60%
Retirees not eligible to care or not available to retirees*	9	14.06%	4.55%
Never see the same doctor	6	9.38%	3.03%
Have good insurance	4	6.25%	2.02%
Treated better or with more respect at civilian provider	4	6.25%	2.02%
Did not need health care	3	4.69%	1.52%
MACH sent me to civilian provider	3	4.69%	1.52%
On Medicare**	3	4.69%	1.52%
Use VA hospital	2	3.13%	1.01%
MACH does not carry my prescription	2	3.13%	1.01%
Civilian provider in more convenient location	2	3.13%	1.01%
MACH visits too [more] time consuming	2	3.13%	1.01%
More specialists in civilian provider's office	1	1.56%	0.51%
No confidence in military doctors	1	1.56%	0.51%
Use DDEAMC	1	1.56%	0.51%
New in the military	1	1.56%	0.51%
Poor telephone access into the clinics	1	1.56%	0.51%
Totals	64		198

* Were usually told this by someone in MACH.

** Implying that MACH does not or can not see Medicare patients.

APPENDIX 10

DEA REFORMULATIONS
(for use with linear programming software packages)

The number of linear programs equals the number of evaluated service units. The objective function for the first unit would look like this:

$$\text{Max } E = u_1O_{11} + u_2O_{21} + \ldots u_rO_{r1}$$

It would be subject to the constraint that the same set of coefficients is applied to all other service units:

$$\text{s.t. } v_1I_{11} + v_2I_{21} + \ldots v_mI_{m1} = 1$$

and the following constaints:

$$u_1O_{11} + u_2O_{21} + \ldots u_rO_{r1} - v_1I_{21} - \ldots v_mI_{m1} <= 0$$

through

$$u_1O_{12} + u_2O_{22} + \ldots u_rO_{r2} - v_1I_{12} - v_2I_{22} - \ldots v_mI_{m2} <= 0$$

E = efficiency ratio

u and v = coefficients

m = number of input measures

r = number of output measures

O = outputs for units l to r

I = inputs for units l to m

Source: Young, Scott T. 1992. Multiple productivity measurement approaches for management. *Health Care Management Review* 17 (Spring): 51-58.

REFERENCES

Barnes, Donelle, Carmen Eribes, Teresa Juarbe, Martha Nelson, Susan Proctor, Linda Sawyer, Muriel Shaul, and Afaf Ibrahim Meleis. 1995. Primary health care and primary care: A confusion of philosophies. *Nursing Outlook* 43 (January/February): 7-16.

Bell, Louis. 1991. Providing primary care to children in the emergency department: A problem of a missed opportunity? *Pediatric Emergency Care* 7 (2): 124.

Braendel, Douglas. 1995. Methodology for determining users for resources allocation model/Transfer Payments. A briefing to the OASD (HA) - U.S. Army-Baylor University Graduate Program Administrative Resident Seminar attendees. The Pentagon, 13 June.

Burns, Nancy and Susan K. Grove. 1987. *The practice of nursing research: Conduct, critique and utilization.* Philadelphia: W.B. Saunders Company.

Charnes, A., W. Cooper, and E. Rhodes. 1978. Measuring the efficiency of decision-making units. *European journal of Operational Research* 2 (6): 429-44.

Derlet, Robert W., Donna Kinser, Lou Ray, Bridget Hamilton, and Judy McKenzie. 1995. Prospective identification and triage of nonemergency patients out of an emergency department: A 5-year study. *Annals of Emergency Medicine* 25 (February): 215-23.

Emory, C. William and Donald R. Cooper. 1991. *Business research methods.* 4th ed. Homewood, IL: Irwin.

Fort Jackson. 1994. *FY 1994 Fort Jackson statistical data.* Directorate of Resources Management, Fort Jackson, South Carolina.

Frelick, Robert W. 1992. Special article: Is better access to medical care needed in Delaware? *Delaware Medical Journal* 64 (November): 685-89.

Fries, James F., C. Everett Koop, Carson E. Beadle, Paul P. Cooper, Mary Jane England, Roger F. Greaves, Jacque J. Sokolov, Daniel Wright, and the Health Project Consortium. 1993. Reducing health care costs by reducing the need and demand for medical services. *New England Journal of Medicine* 329 (July 29): 321-25.

Gebicke, Mark E. 1995. *Wartime medical care: Aligning sound requirements with new combat care approaches is key to restructuring force*. Testimony Before the Subcommittee on Military Personnel, Committee on National Security, House of Representatives GAO/T-NSIAD-95-129 (March 30).

General Accounting Office. 1995. *Defense health care: Issues and challenges confronting military medicine*. Report to Congressional Requesters GAO/HEHS-95-104 (March).

General Accounting Office. Health, Education, and Human Services Division. 1994. *Uniformed services treatment facility health care program*. Report prepared by David P. Baine, Director, Federal Health Care Delivery Issues. June 2.

Ginzberg, Eli. 1991. Public-private issues and access. *Bulletin of the New York Academy of Medicine* 67 (January-February): 55-58.

Hao, Steve (Horng-Shu) and C. Carl Pegels. 1994. Evaluating relative efficiencies of Veterans Affairs Medical Centers using data envelopment, ratio, and multiple regression analysis. *Journal of Medical Systems* 18 (April): 55-67.

Hargraves, J. Lee, R. Heather Palmer, Jane Zapka, David Nerenz, Howard Frazier, E. John Orav, Cheryl Warner, John Ingard, and Ross Neisuler. 1993. Using patient reports to measure health care system performance. *Clinical Performance and Quality Health Care* 1 (October/November/December): 208-13.

Kongstvedt, Peter R. 1993. *The managed health care handbook*. 2d ed. Gaithersburg: Aspen Publishers, Inc.

Lee, J.G., R.W. Clarke, and G.H. Glassford. 1993. Physicians can benefit from a patient-focused hospital. *Physician Executive* 19 (January-February): 36-38.

Leedy, Paul D. 1985. *Practical research: Planning and design*. 3d ed. New York: Macmillan Publishing Company.

Mayberry, Adrienne. 1991. Productivity and cost-effectiveness measures: factors in decision making. *Nursing Administration Quarterly* 15 (Summer): 29-35.

McAlister, W. Howard and David W. Davidson. 1992. A 1988 survey of federal service optometrists. *Journal of the American Optometric Association* 63 (July): 500-3.

McCullough, Michael L. 1990. Physician activity: A large group view. *National Forum On Hospital and Health Affairs* :75-78.

Meditz, Robert W., Carol L. Manberg, and Fred Rosner. 1992. Improving access to a primary care medical clinic. *Journal of the National Medical Association* 84: 361-64.

Meek, Joseph E. 1990. Primary care. *Kansas Medicine* 91 (September): 222-23.

Neal, Regina. 1990. The empire strikes back. Broken promises: Columbia-Presbyterian Medical Center. Ignoring the community's needs: St. Luke's-Roosevelt Hospital Center. *Health/PAC Bulletin* 20 (Spring): 4-10.

North, Nicola. 1991. Primary care services: In search of alternative ways of providing services that are affordable, accessible and appropriate (a review of recent literature). *Nursing Praxis in New Zealand* 6 (July): 11-18.

Office of the Assistant Secretary of Defense (Personnel and Readiness). 1993. *Analysis of the 1992 DoD survey of military medical care beneficiaries.* Prepared per the National Defense Authorization Act for Fiscal years 1992 and 1993, Section 733.

Osterweis, Marian and Julianne R. Howell. 1979. Administering patient satisfaction questionnaires at diverse ambulatory care sites. *The Journal of Ambulatory Care Management* 2 (August): 67-88.

Peterson, Morris. 1995. Telephone conversation. Department of Army Research. 22 February.

Ray, Marilyn A. 1993. A descriptive study of care processes using Total Quality Management as a framework in a USAF regional hospital emergency service and related services. *Military Medicine* 158 (June): 396-403.

Rostenberg, Bill. 1986. *Design planning for freestanding ambulatory care facilities*. Chicago: American Hospital Publishing, Inc.

Sherman, David H. 1984. Improving the productivity of service businesses. *Sloan Management Review* 25 (Spring): 11-23.

Silkman, Richard H. 1986. *Measuring efficiency: An assessment of data envelopment analysis*. San Francisco: Jossey-Bass Inc., Publishers.

Steiber, Steven R. and William J. Krowinski. 1990. *Measuring and managing patient satisfaction*. Chicago: American Hospital Publishing, Inc.

Tri-Service CHAMPUS Statistical Database. Medical Analysis Support System (MASS). *U.S. Army Health Care Studies*. Fort Sam Houston, Texas. Retrieved 6 December 1994.

Young, Scott T. 1992. Multiple productivity measurement approaches for management. *Health Care Management Review* 17 (Spring): 51-58.